Gap and connection between laboratory research and field application of the CIT in Japan

Akemi Osugi
Forensic Science Laboratory,
Hyogo, Japan

Introduction

- Concealed Information Test (CIT) is scientifically recognized to be a valid and reliable method in laboratory research.

- CIT has not been utilized in the field, except Japan.

CIT has been considered there are extraordinary gaps and few connections between laboratory research and the field application.

Aim:

To demonstrate whether or not there are gaps and connections between laboratory and the field.

Daily application in Japan

- About 100 polygraph examiners conduct approximately 5,000 examinations annually.
- These examinations conducts for almost all kinds of crimes.

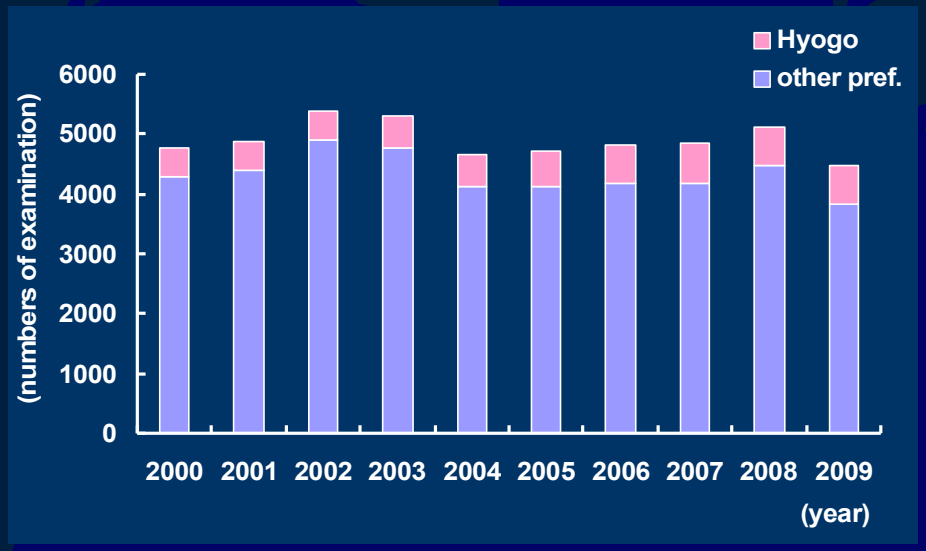


Fig.1. The number of examination in last decade in Japan

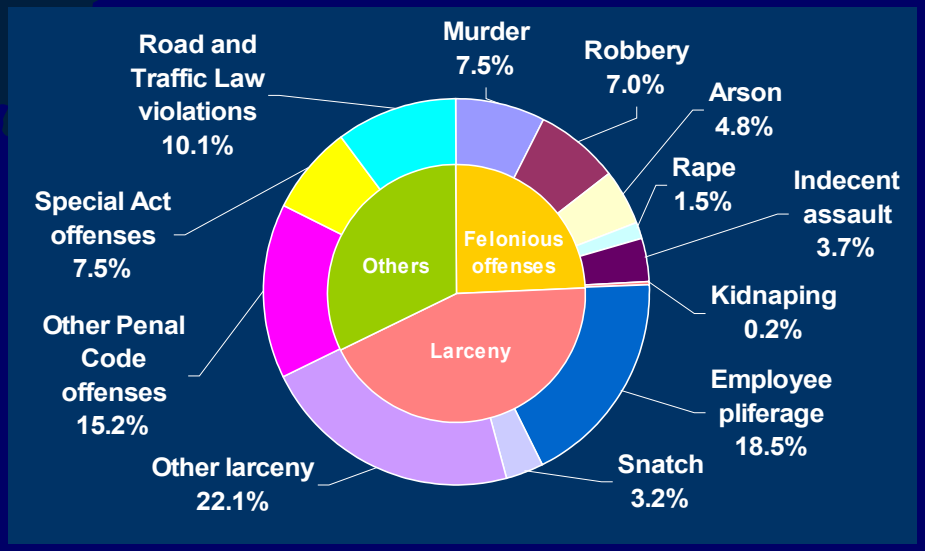
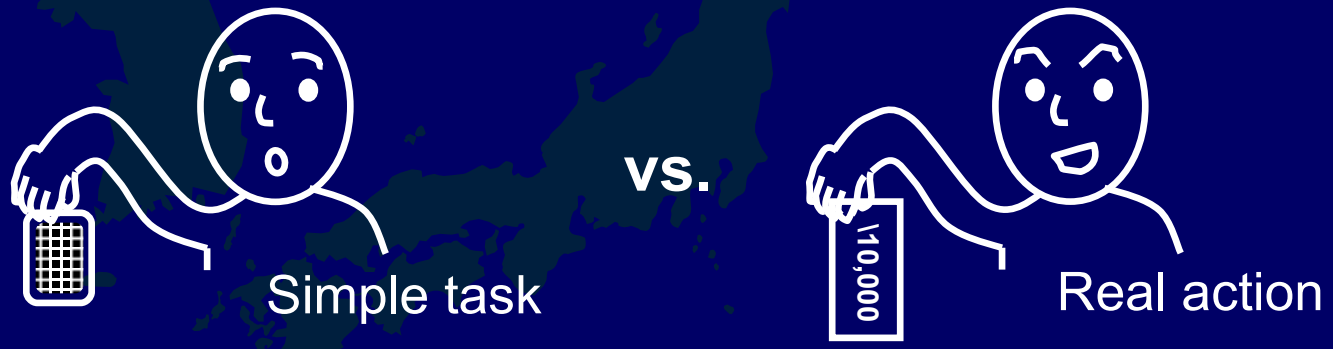


Fig.2. Fraction separated by different crimes (2009)

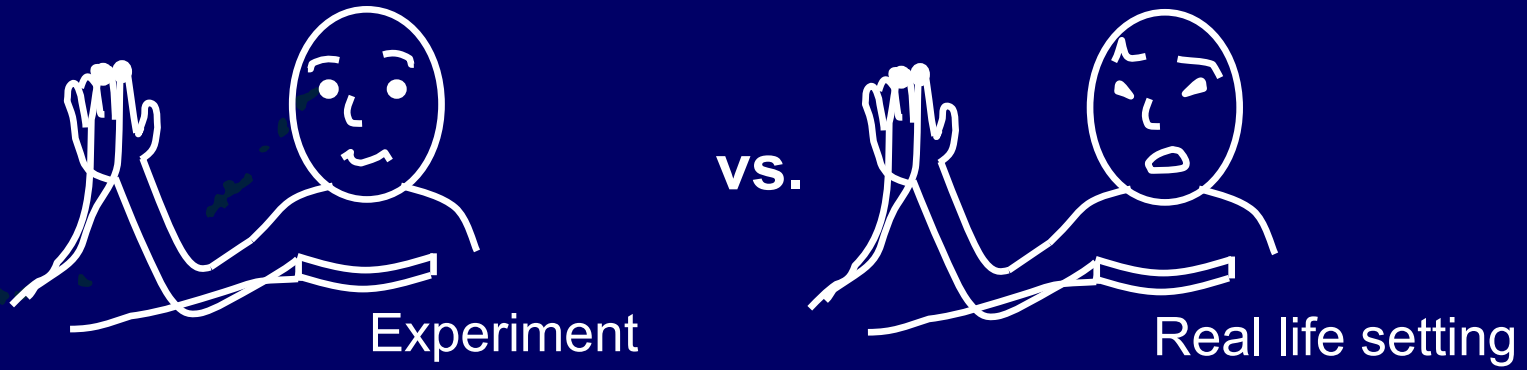
What would be the gaps?

Laboratory experiment and the field examination could be different in...

1. Encoding situation



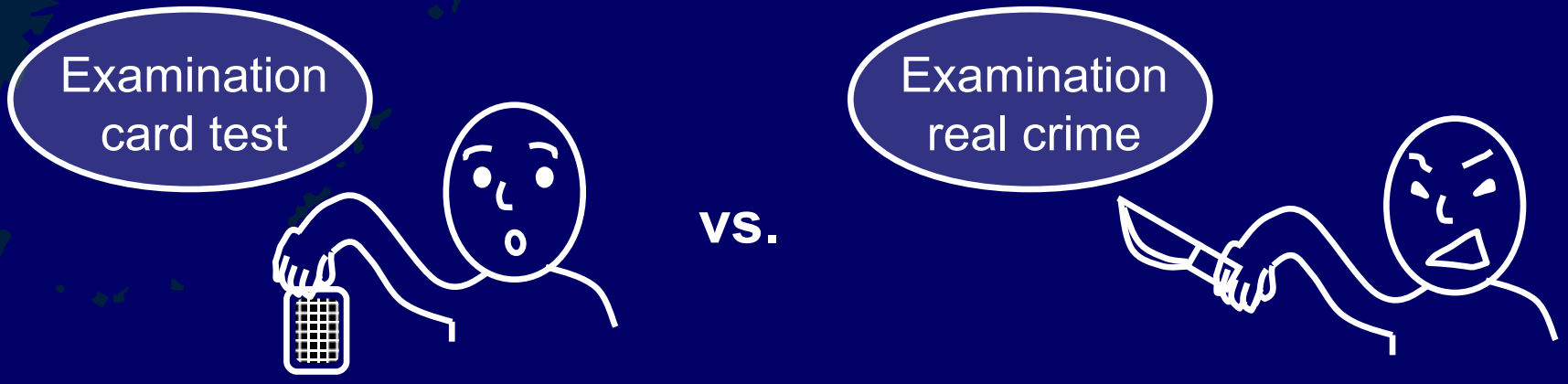
2. Retrieving situation



1. Encoding situations could be a vital gap?

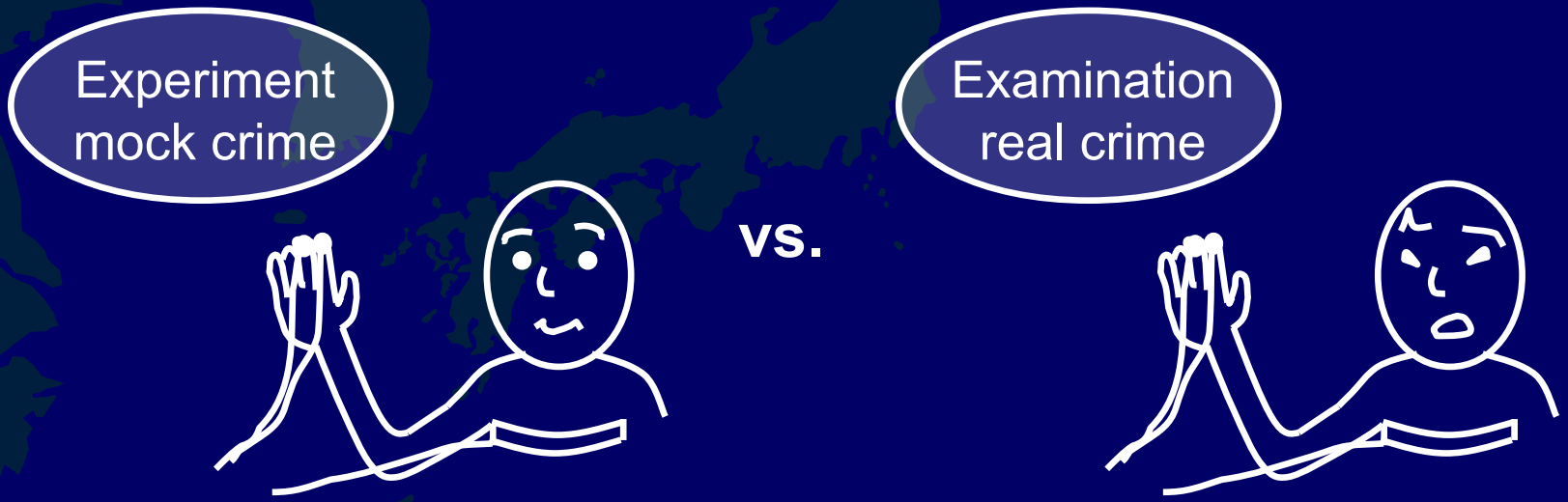
(1) Comparing Card test with mock crime in laboratory experiment

(2) Comparing Card test with real crime in the field examination



2. Retrieving situations could be a vital gap?

(3) Comparing mock crime in laboratory experiment with real crime in the field examination



→ With these 3 comparisons, gap and connection between laboratory research and the field application are investigated.

(1) Card vs. Mock crime in Exp.

- Participants:

  16 police members (9 male, 7 female; 28.4 yrs)

- Indices:

  respiratory speed (RS),
  skin conductance response (SCR), heart rate (HR),
  normalized pulse volume (NPV)

- Procedure:

Mock crime task → Card test → CIT for mock crime

In another room, participants stole \10,000 from:

- Bag
- Jacket
- Notebook
- Box
- ~~Basket~~

Participants picked one card out of five and memorized the number.

Is the number...

- 3 ?
- 4 ?
- 5 ?
- 6 ?
- 7 ?

Did you steal \10,000 from...

- Bag ?
- Jacket ?
- Notebook ?
- Box ?
- Basket ?

(1) Results

Respiratory speed (RS)

T-TESTS

card: critical < non-critical

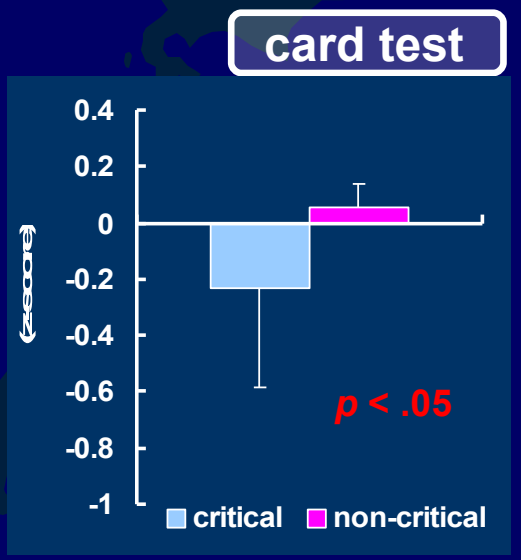
mock: critical < non-critical

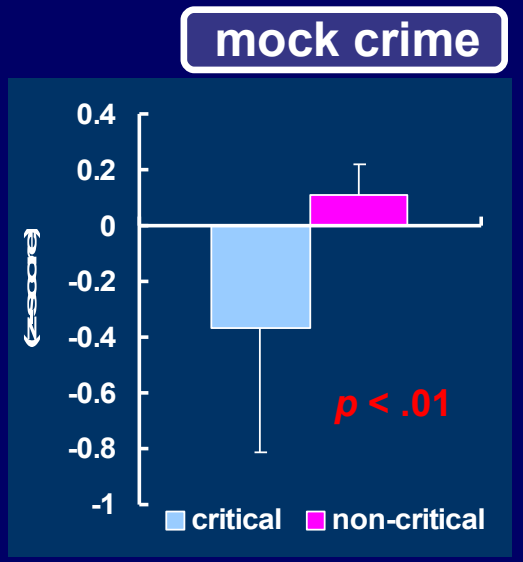
ANOVA

Task (card / mock crime) x Item (critical / non-critical)

Main effect of Item:

critical < non-critical ($p < .01$)





Skin conductance response (SCR)

T-TESTS

card: critical > non-critical

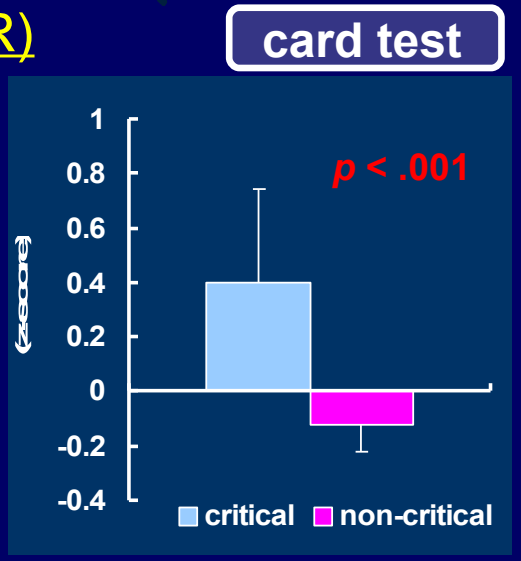
mock: critical > non-critical

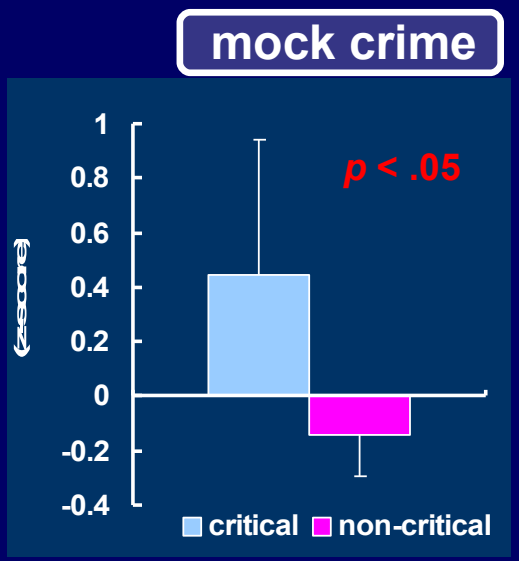
ANOVA

Task (card / mock crime) x Item (critical / non-critical)

Main effect of Item:

critical > non-critical ($p < .001$)





(1) Results

Heart rate (HR)

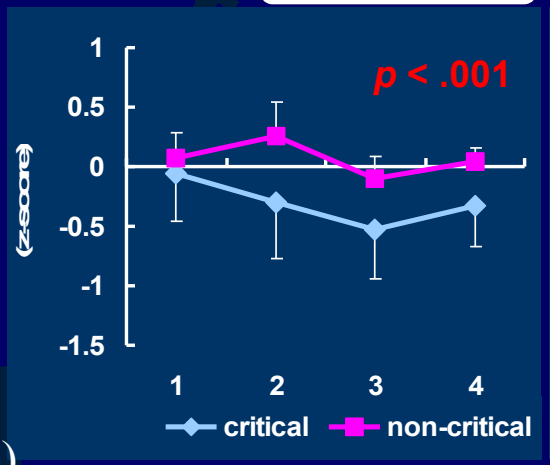
ANOVA
Item (cri / non-cri) x Block (0- / 5- / 10- / 15- sec)

card: critical < non-critical at 2-4
mock: critical < non-critical at 2-4

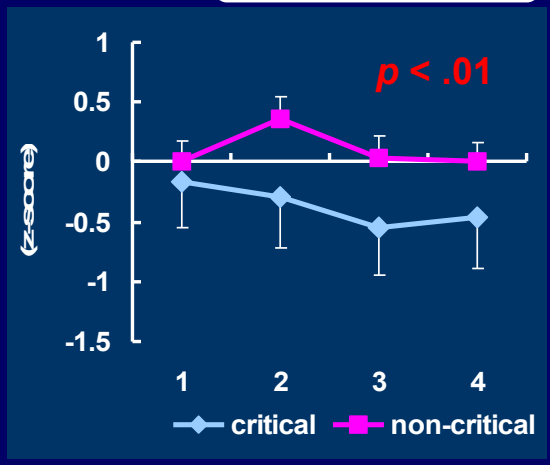
ANOVA
Task (card / mock crime) x Item x Block

Interaction of Item x Block:
critical < non-critical at 2-4 ($p < .001$)

card test



mock crime



Normalized pulse volume (NPV)

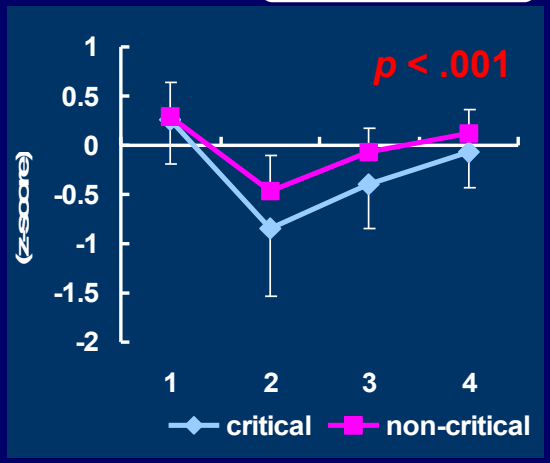
ANOVA
Item (cri / non-cri) x Block (0- / 5- / 10- / 15- sec)

card: critical < non-critical at 2-4
mock: critical < non-critical, 1 > 2-3

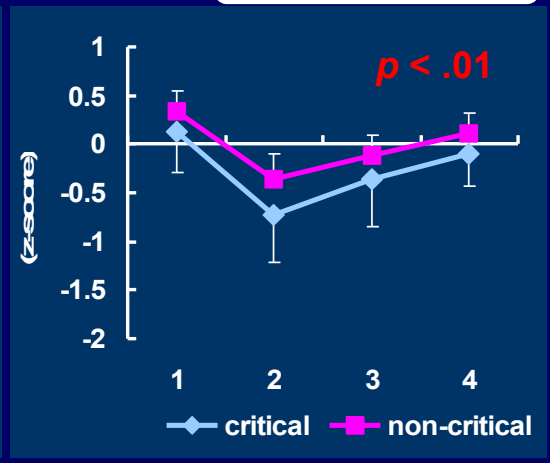
ANOVA
Task (card / mock crime) x Item x Block

Interaction of Item x Block:
critical < non-critical at 2-4 ($p < .01$)

card test



mock crime



(2) Card vs. Real crime in Exam.

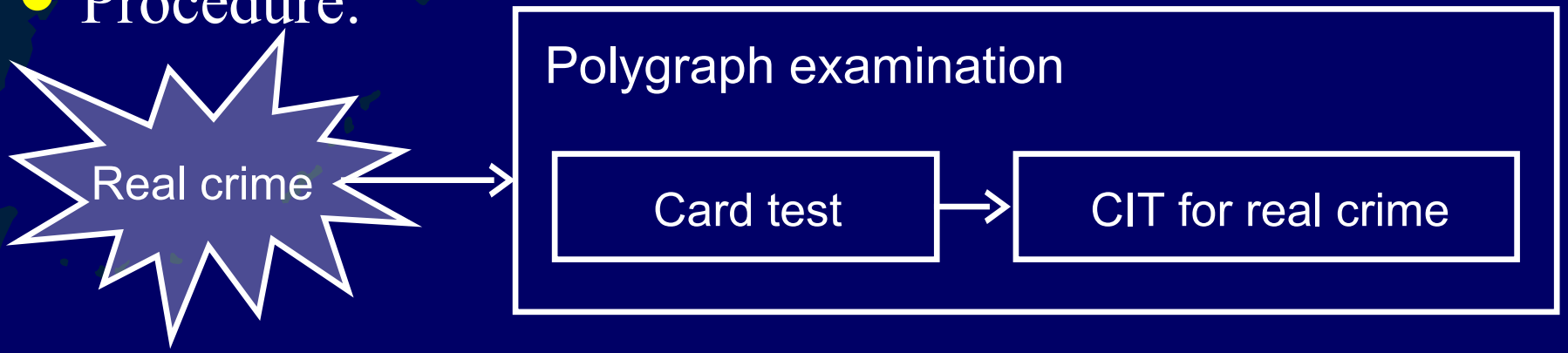
- Participants:

  16 guilty persons (16 male, 0 female; 31.2 yrs)

- Indices:

  respiratory speed (RS),
  skin conductance response (SCR), heart rate (HR),
  normalized pulse volume (NPV)

- Procedure:



Real crime

Polygraph examination

Card test → CIT for real crime

Various crimes occurred in 2009 and 2010, in Hyogo pref.

ex. theft, hit and run, indecent assault, snatch, molester, cultivation of hemp, injury etc

The same procedure as experiment.

Card test was always conducted before questions of the crime to make participants understand the CIT procedure.

One question confirmed that examinee recognized critical item after examination was chosen.

(2) Results

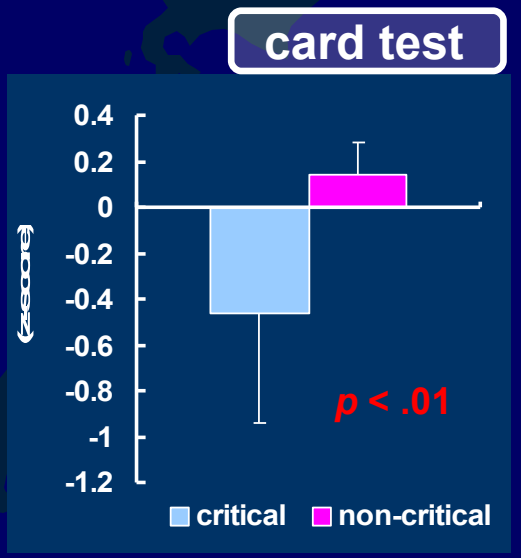
Respiratory speed (RS)

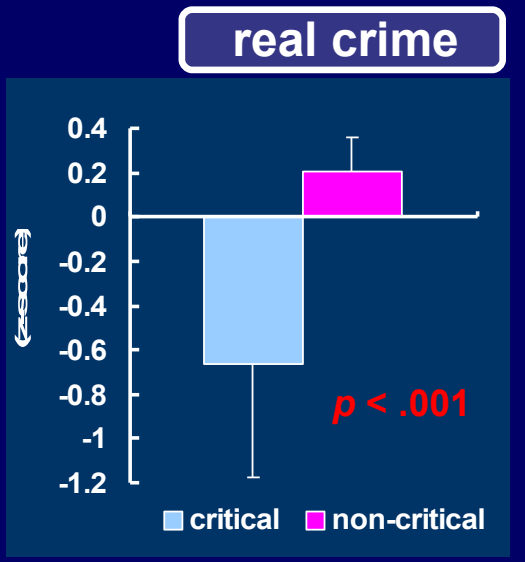
T-TESTS

card: critical < non-critical
real: critical < non-critical

ANOVA
Task (card / real crime) x Item (critical / non-critical)

Main effect of Item:
critical < non-critical ($p < .001$)





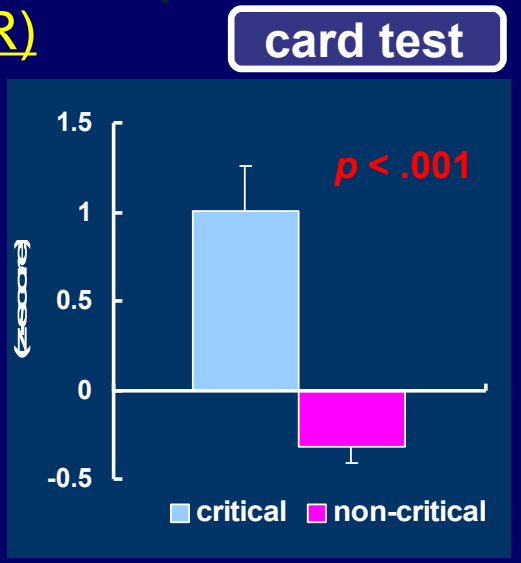
Skin conductance response (SCR)

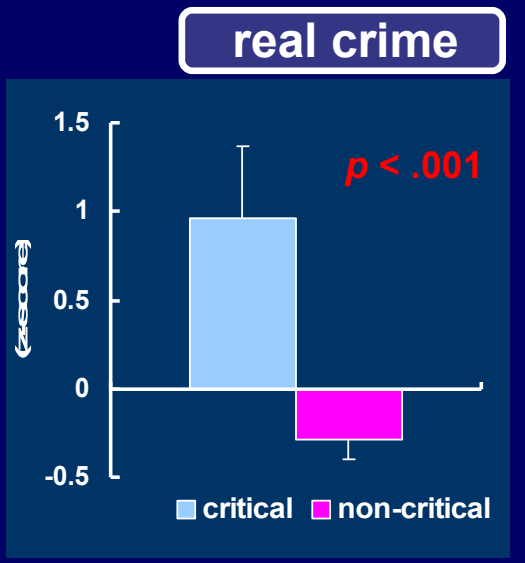
T-TESTS

card: critical > non-critical
real: critical > non-critical

ANOVA
Task (card / real crime) x Item (critical / non-critical)

Main effect of Item:
critical > non-critical ($p < .001$)





(2) Results

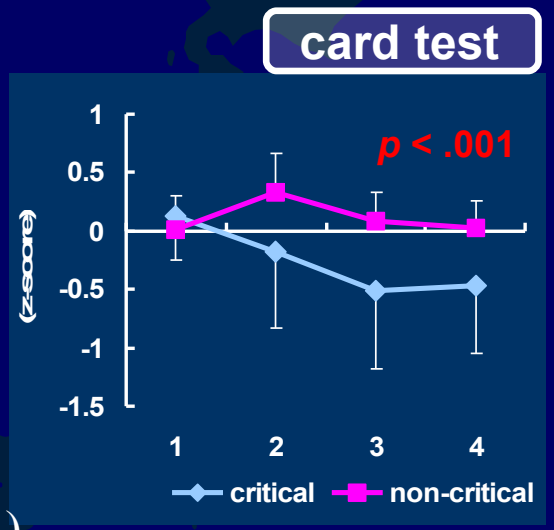
Heart rate (HR)

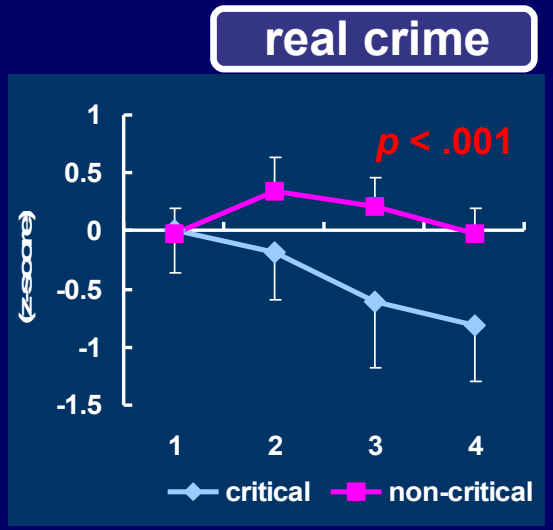
ANOVA
Item (cri / non-cri) x Block (0- / 5- / 10- / 15- sec)

card: critical < non-critical at 2-4
real: critical < non-critical at 2-4

ANOVA
Task (card / mock crime) x Item x Block

Interaction of Item x Block:
critical < non-critical at 2-4 ($p < .001$)





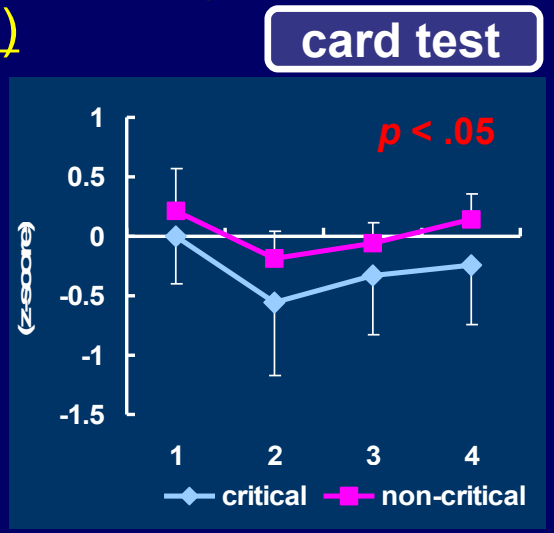
Normalized pulse volume (NPV)

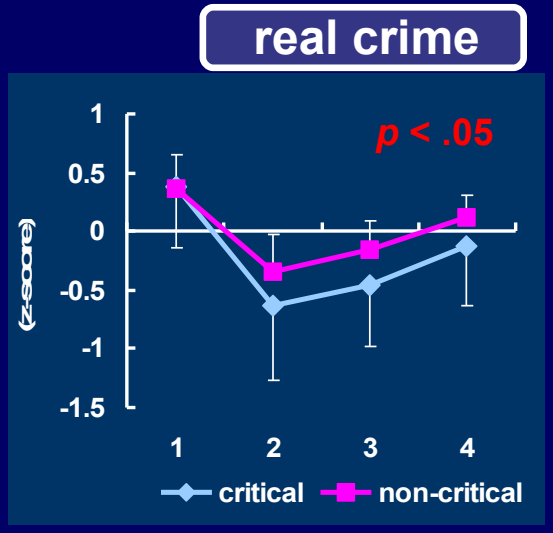
ANOVA
Item (cri / non-cri) x Block (0- / 5- / 10- / 15- sec)

card: critical < non-critical, 1 > 2-3
real: critical < non-critical, 1 > 2-4

ANOVA
Task (card / mock crime) x Item x Block

Main effect of Item, Block ($p < .05$)
Interaction of Task x Block ($p < .01$)

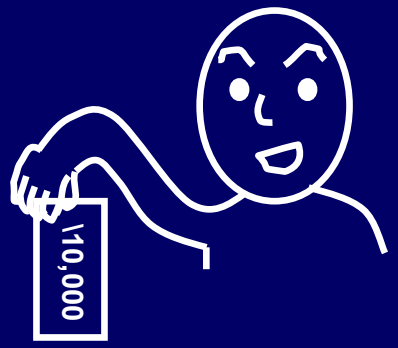




(3) Mock crime vs. Real crime

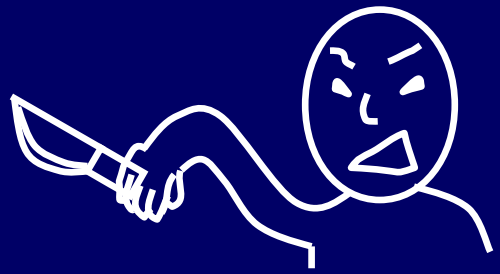
- Participants:

  mock crime group: 16 police members
  real crime group: 16 guilty persons



- Indices:

  respiratory speed (RS),
  skin conductance response (SCR), heart rate (HR),
  normalized pulse volume (NPV)



(3) Results

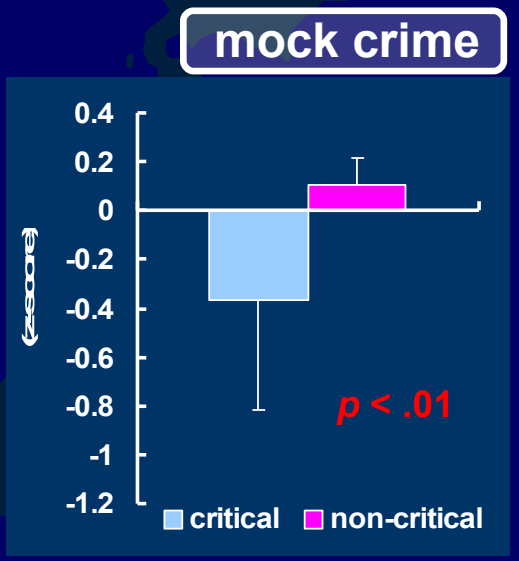
Respiratory speed (RS)

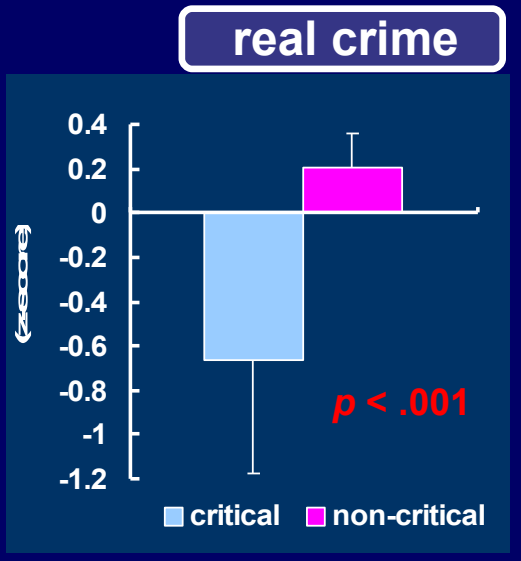
T-TESTS

mock: critical < non-critical
real: critical < non-critical

ANOVA
Group (mock / real crime) x Item (critical / non-critical)

Main effect of Item:
critical < non-critical ($p < .001$)





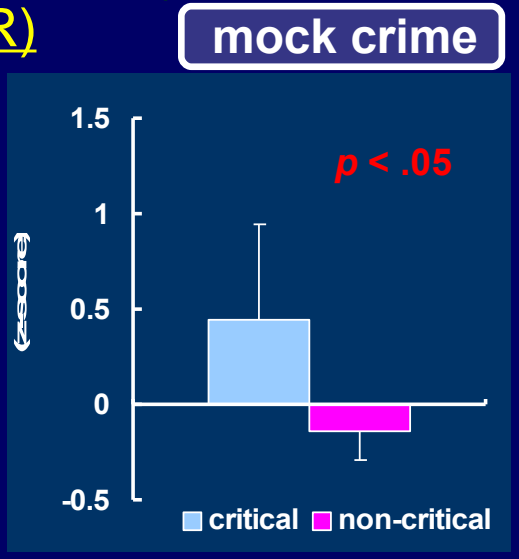
Skin conductance response (SCR)

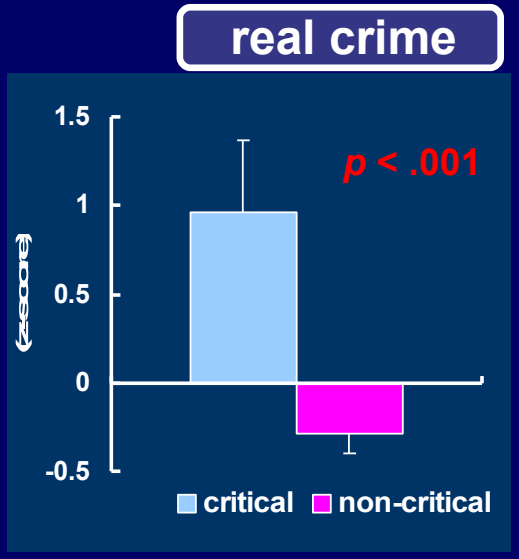
T-TESTS

mock: critical > non-critical
real: critical > non-critical

ANOVA
Group (mock / real crime) x Item (critical / non-critical)

Main effect of Item:
critical > non-critical ($p < .01$)





(3) Results

Heart rate (HR)

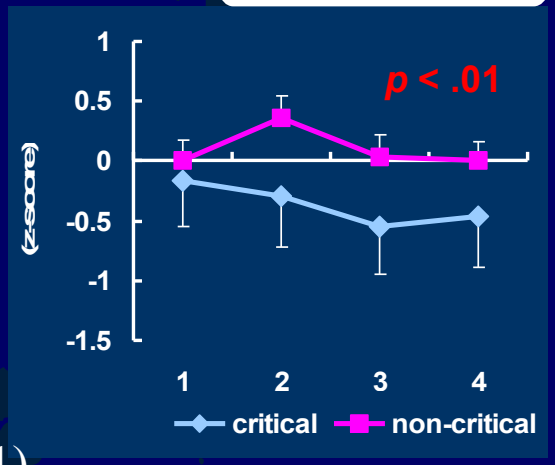
ANOVA
Item (cri / non-cri) x Block (0- / 5- / 10- / 15- sec)

mock: critical < non-critical at 2-4
real: critical < non-critical at 2-4

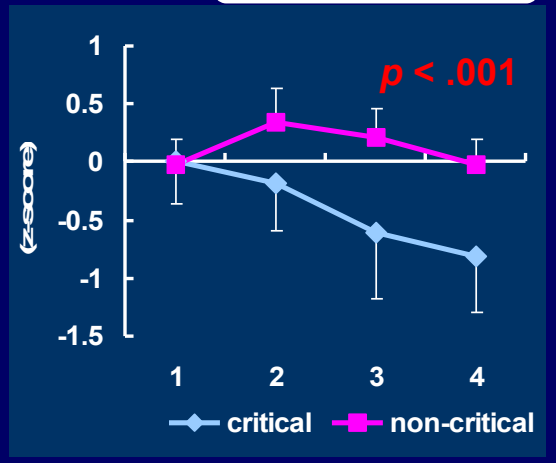
ANOVA
Group (mock / real crime) x Item x Block

Interaction of Item x Block:
critical < non-critical at 2-4 ($p < .001$)

mock crime



real crime



Normalized pulse volume (NPV)

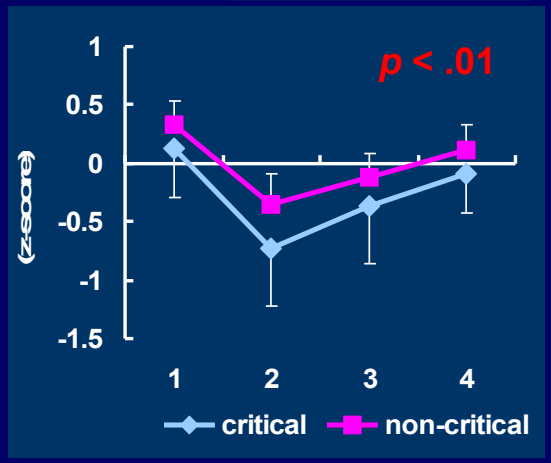
ANOVA
Item (cri / non-cri) x Block (0- / 5- / 10- / 15- sec)

mock: critical < non-critical, 1 > 2-3
real: critical < non-critical, 1 > 2-4

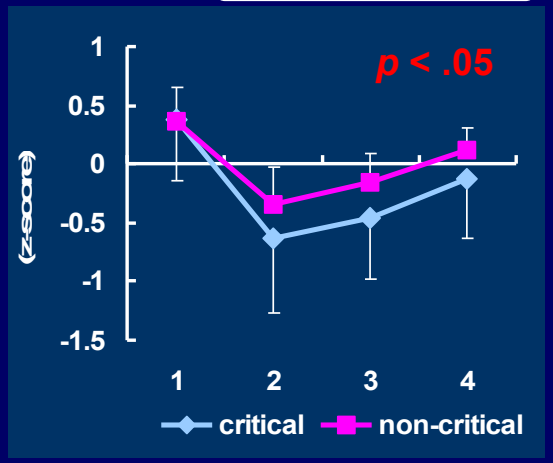
ANOVA
Group (mock / real crime) x Item x Block

Interaction of Item x Block:
critical < non-critical at 2-4 ($p < .05$)

mock crime



real crime



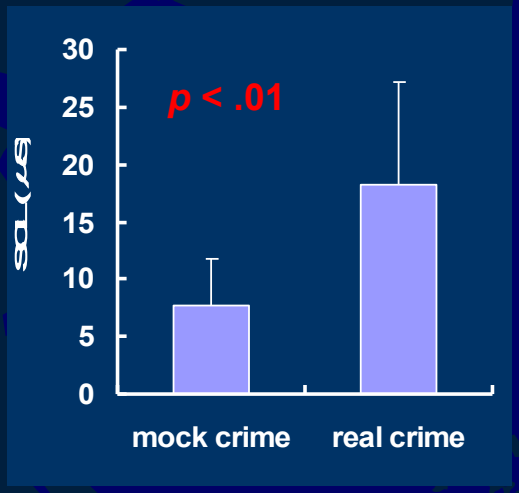
Strong connection !

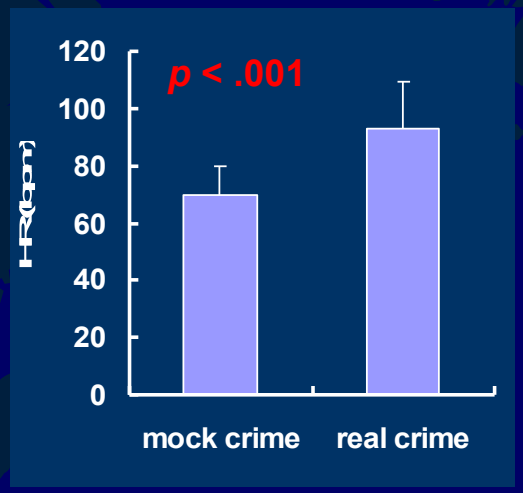
- Under all conditions, the same responding patterns were shown.
- Under all conditions, the differences between critical item and non-critical items were significant.
- There was no difference among these conditions.

→ There is no essential gap which possibly denys the detection ability of the CIT.

No gaps?

Arousal level



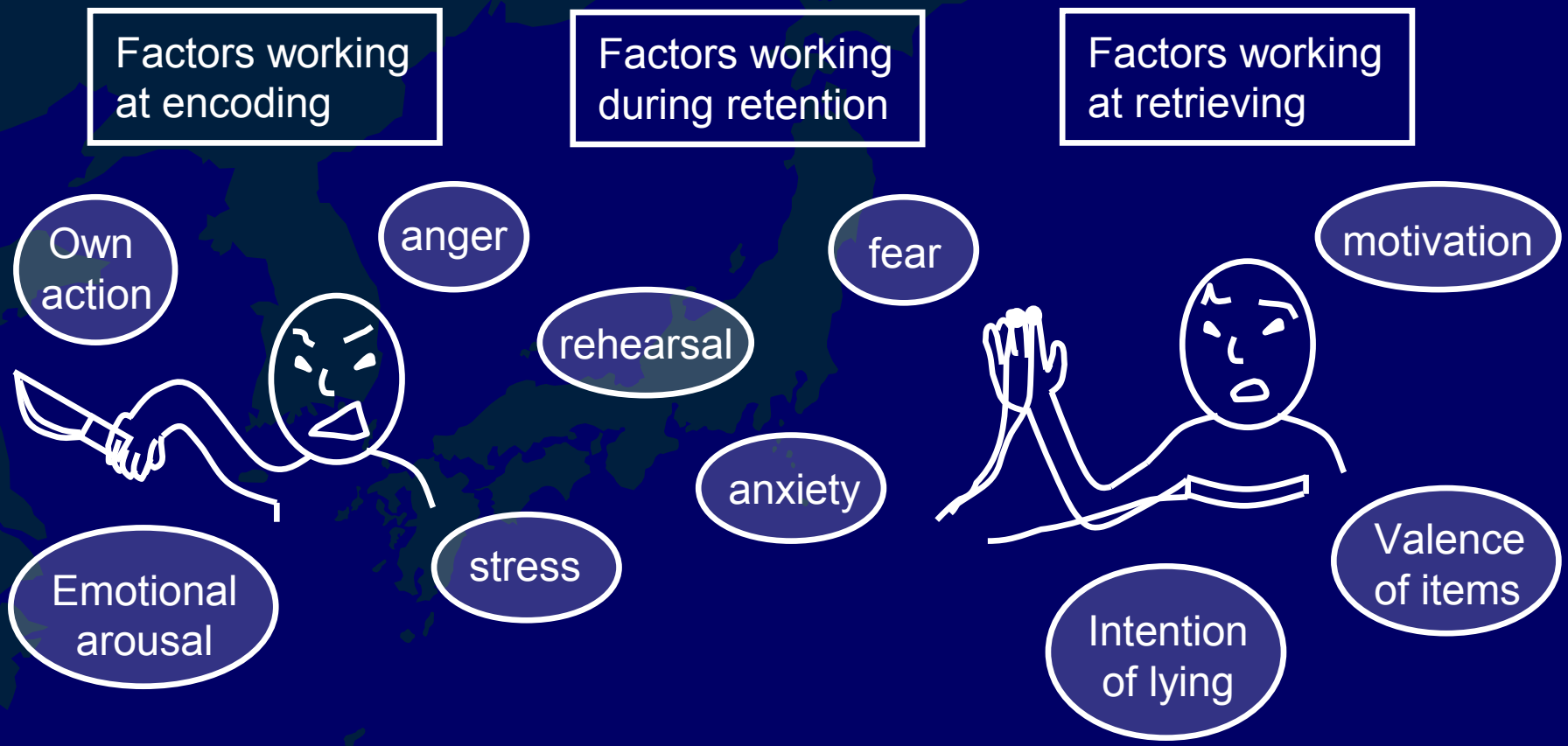


Effect size (Cohen' d) separated by indices

	Mock crime		Real crime
RS	1.43	<	2.22
SCR	1.52	<	3.99
HR	1.80		1.81
NPV	0.89		0.57

- There would be some factors raising the arousal level and increasing the difference between critical item and non-critical items in the field examination.

Plus factors?

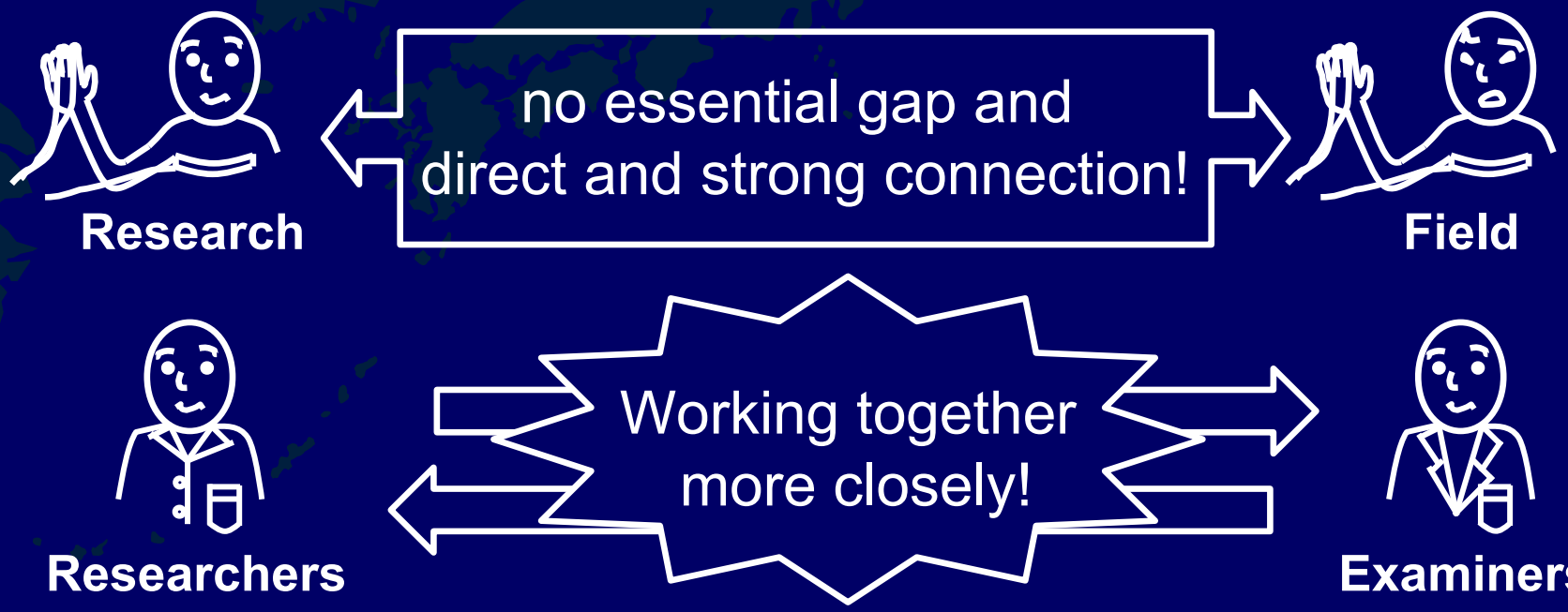


These factors are to increase the difference between critical and non-critical, but they won't be the factors to make essential gaps between laboratory research and the field application.

Expectation to laboratory research

- Only in laboratory research these plus factors can be controlled.
- By systematically probing how these factors effect on the CIT, the mechanism of the CIT should be made clearer.

Conclusions:



Thank you for your attention!

Contact Information

Akemi Osugi

akemiosugi-74@ch-i.jp